TECTONIC VERSUS REBOUND-INDUCED MOTION IN ANTARCTICA

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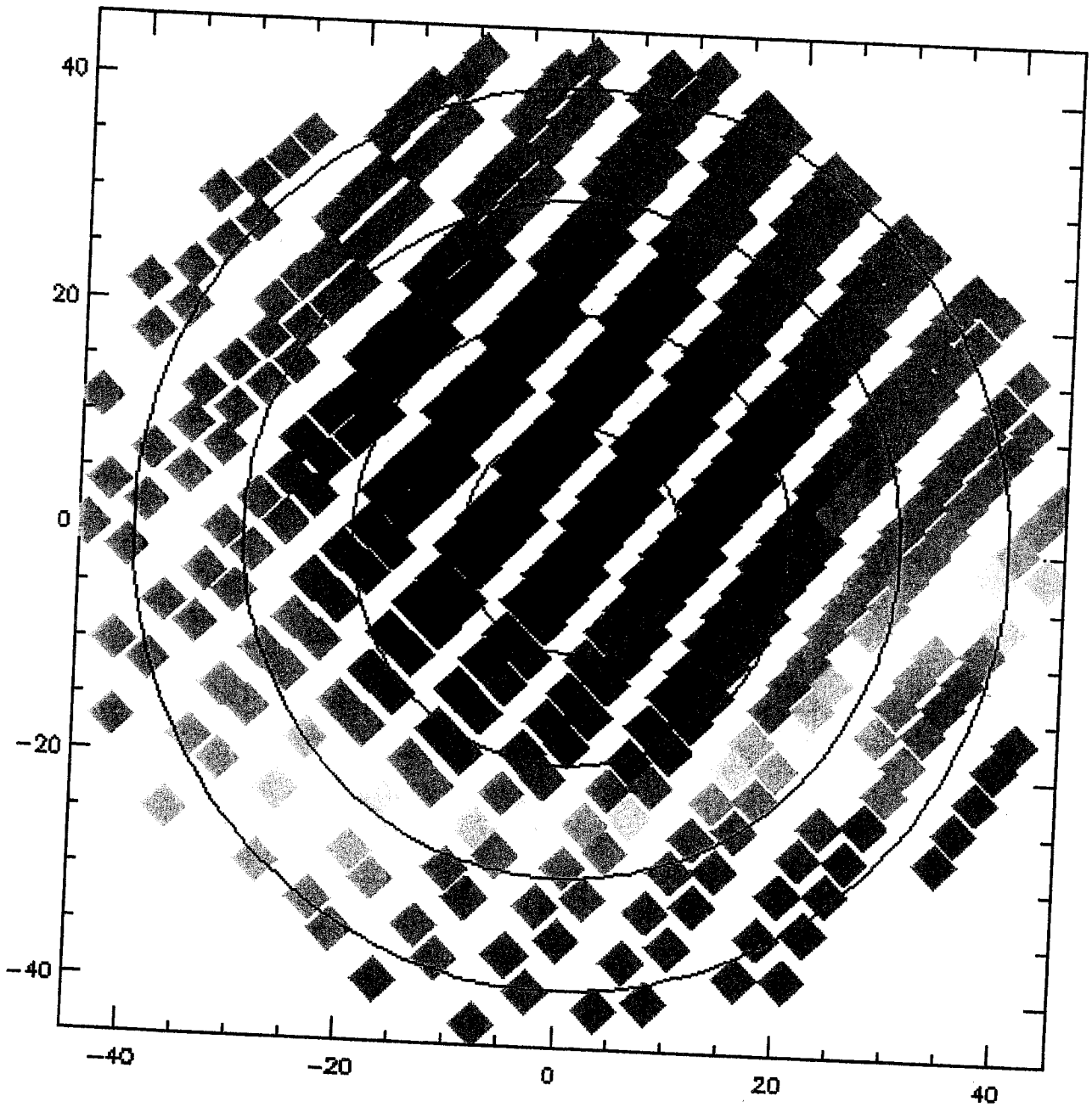
Deformation within the Antarctic continent comprises post-glacial rebound, elastic strain from present-day ice mass changes, and tectonic motion. We compare the expected signals from these three sources for sites on the Antarctic continent, in an effort to elucidate how these expected signals differ, or overlap, and how they may be distunguished. Tectonic strain estimates are bounded by plate circuit arguments and limits on vertical strain rates. Isostatic motion is estimated from models that consider a variety of scenarios for deglaciation from Last Glacial Maximum (LGM) as well as neoglacial history. For a range of plausible scenarios, vertical strain is dominated by isostatic rebound. In the case of neoglacial flucuations, the horizontal deformation rates associated with glacial loading and unloading can also rival expected tectonic strain rates. Global Positioning System (GPS) measurements of crustal deformation in Antarctica are becoming more numerous, with the current emphasis on improving the distribution of sites and networks on interior bedrock. We discuss the role of a network of strategically-placed GPS sites within an observational strategy to measure the mass balance of the Antarctic Ice Sheet. Such a strategy includes time-varying gravity data from the Gravity Recovery and Atmospheric Change Experiment (GRACE), topographic changes from ICESat, and glacial history from ice cores, to discern the ice mass load evolution from LGM and, by subtraction, the neotectonic deformation of the Antarctic continent.



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